

10/005,060
Application Serial No. 10/005,060
Reply to Office Action of July 30, 2003

Patent
Attorney Docket No. CU-2746

"PROPOSED ONLY"

TO: EXAMINER
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Amendments To The Claims
(In The Revised Format)

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The listing of claims presented below will replace all prior versions, and listings, of claims in the application.

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Listing of claims:

1. (currently amended) A liquid crystal display device utilizing a fringe field switching (FFS) mode comprising:

a lower substrate having a lower inner surface and a lower outer surface, wherein the lower substrate is rubbed in a rubbing direction for alignment of liquid crystal molecules;

a lower polarizing plate formed on the lower outer surface;

an upper substrate having an upper inner surface and an upper outer surface, wherein the lower inner surface and the upper inner surface face each other at a distance in a substantially parallel manner;

an upper polarizing plate formed on the upper outer surface;

a counter electrode formed on a portion of the lower inner surface, wherein the counter electrode has a rectangular plate shape;

an insulating layer formed on the counter electrode and the lower inner surface;

a pixel electrode formed on a portion of the insulating layer, wherein the pixel electrode is made from a plurality of V-shaped conductors symmetrically arranged with one end of each of the V-shaped conductors connected to each other by one continuous conductor and with the other end of each of the V-shaped conductors connected to each other by another continuous conductor, thereby forming a V-

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shaped slit between two symmetrically arranged V-shaped conductors ~~patterned as a plurality of electrical conductors~~;

a data bus line formed on a portion of the insulating layer, wherein a noise field is formed between the data bus line and the pixel electrode and between the data bus line and the counter electrode, and further wherein the rubbing direction of the lower substrate substantially corresponds to the direction of the noise field; and

a gate bus line formed substantially perpendicular to the data bus line on a different layer.

2. (currently amended) The liquid crystal display device according to claim 1, wherein the counter electrode and the pixel electrode are made of a transparent electrical conductor including an indium tin oxide (ITO) for forming ~~a~~ the fringe field switching (FFS) mode.
3. (canceled)
4. (previously presented) The liquid crystal display device according to claim 1, further comprising a black matrix formed on the upper inner surface substantially covering the data bus line, wherein the rubbing direction of the lower substrate is substantially parallel to the gate bus line, which is also substantially parallel to the direction of the noise field formed between the data bus line and the counter electrode or between the data bus line and the pixel electrode.
5. (currently amended) The liquid crystal display device according to ~~claim 4~~ claim 1, wherein the rubbing direction of the lower substrate is substantially parallel to the gate bus line and there is no black matrix formed on the upper inner surface of the upper substrate.
6. (currently amended) The liquid crystal display device according to claim 4, wherein the black matrix formed on the upper inner surface has a width that is substantially equal to or smaller than ~~the~~ a distance between the counter electrode in one pixel and another counter

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electrode in an adjacent pixel with the data bus line formed between the two counter electrodes of the two adjacent pixels.

7. (previously presented) A liquid crystal display device comprising:

a lower substrate having a lower inner surface and a lower outer surface, wherein the lower substrate is rubbed in a rubbing direction for alignment of liquid crystal molecules;

a lower polarizing plate formed on the lower outer surface;

an upper substrate having an upper inner surface and an upper outer surface, wherein the lower inner surface and the upper inner surface face each other at a distance in a substantially parallel manner;

an upper polarizing plate formed on the upper outer surface;

a counter electrode formed on a portion of the lower inner surface, wherein the counter electrode has a rectangular plate shape;

an insulating layer formed on the counter electrode and the lower inner surface;

a pixel electrode formed on a portion of the insulating layer;

a data bus line formed on a portion of the insulating layer, wherein a noise field is formed between the data bus line and the pixel electrode and between the data bus line and the counter electrode and further wherein the rubbing direction of the lower substrate substantially corresponds to the direction of the noise field;

a gate bus line formed substantially perpendicular to the data bus line; and

a black matrix formed on the upper inner surface substantially covering the data bus line,

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wherein the rubbing direction of the lower substrate is substantially parallel to the gate bus line, which is also substantially parallel to the direction of the noise field formed between the data bus line and the counter electrode or between the data bus line and the pixel electrode, and

further wherein the black matrix formed on the upper inner surface has a width of less than $6\text{ }\mu\text{m}$ that is substantially equal to or smaller than the distance between the counter electrode in one pixel and another counter electrode in an adjacent pixel with the data bus line formed between the two counter electrodes of the two adjacent pixels.

8. (previously presented) The liquid crystal display device according to claim 13, wherein the rubbing direction of the lower substrate is perpendicular to the gate bus line, and the noise field is formed between the gate bus line and the counter electrode or between the gate bus line and the pixel electrode and therefore, black matrix of the upper substrate is formed on the gate bus line to have a width the same as or smaller than that of the gate bus line.
9. (currently amended) The liquid crystal display device according to ~~claim 8~~ claim 13, wherein the rubbing direction of the lower substrate is perpendicular to the gate bus line and there is no black matrix of the upper substrate.
10. (Original) The liquid crystal display device according to claim 1, wherein the upper substrate has a rubbing direction anti-parallel or parallel to that of the lower substrate.
11. (Original) The liquid crystal display device according to claim 1, wherein the lower polarizing plate has a polarizer axis corresponding with the rubbing direction of the lower substrate.

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12. (Original) The liquid crystal display device according to claim 1, wherein the upper polarizing plate has an analyzer axis perpendicular to the rubbing direction of the lower substrate.
13. (currently amended) A liquid crystal display device utilizing a fringe field switching (FFS) mode comprising:
- a lower substrate having a lower inner surface and a lower outer surface, wherein the lower substrate is rubbed for alignment of liquid crystal molecules;
 - a lower polarizing plate formed on the lower outer surface;
 - an upper substrate having an upper inner surface and an upper outer surface, wherein the lower inner surface and the upper inner surface face each other at a distance in a substantially parallel manner;
 - an upper polarizing plate formed on the upper outer surface;
 - a counter electrode formed on a portion of the lower inner surface;
 - an insulating layer formed on the counter electrode and the lower inner surface;
 - a pixel electrode formed on a portion of the insulating layer, wherein the pixel electrode is made from a plurality of V-shaped conductors symmetrically arranged with one end of each of the V-shaped conductors connected to each other by one continuous conductor and with the other end of each of the V-shaped conductors connected to each other by another continuous conductor, thereby forming a V-shaped slit between two symmetrically arranged V-shaped conductors;
 - a data bus line formed on a portion of the insulating layer; and
 - a gate bus line formed substantially perpendicular to the data bus line, wherein a noise field is formed between the gate bus line and the pixel electrode and between the

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gate bus line and the counter electrode, and further wherein the rubbing direction of the lower substrate substantially corresponds to the direction of the noise field.

14. (currently amended) The A liquid crystal device ~~of claim 13~~ further comprising:
- a lower substrate having a lower inner surface and a lower outer surface,
 - wherein the lower substrate is rubbed for alignment of liquid crystal molecules;
 - a lower polarizing plate formed on the lower outer surface;
 - an upper substrate having an upper inner surface and an upper outer surface, wherein the lower inner surface and the upper inner surface face each other at a distance in a substantially parallel manner;
 - an upper polarizing plate formed on the upper outer surface;
 - a counter electrode formed on a portion of the lower inner surface;
 - an insulating layer formed on the counter electrode and the lower inner surface;
 - a pixel electrode formed on a portion of the insulating layer, wherein the pixel electrode is a data bus line formed on a portion of the insulating layer;
 - a gate bus line formed substantially perpendicular to the data bus line,
 - wherein a noise field is formed between the gate bus line and the pixel electrode and between the gate bus line and the counter electrode, and further wherein the rubbing direction of the lower substrate substantially corresponds to the direction of the noise field; and
 - a black matrix formed on the upper inner surface substantially covering the data bus line,

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wherein the rubbing direction of the lower substrate is substantially parallel to the ~~gate~~ data bus line, which is also substantially parallel to the direction of the noise field formed between the ~~data~~ gate bus line and the counter electrode or between the ~~data~~ gate bus line and the pixel electrode, and

further wherein the black matrix formed on the upper inner surface has a width of less than 6 μm that is substantially equal to or smaller than the distance between the counter electrode in one pixel and another counter electrode in an adjacent pixel with the data bus line formed between the two counter electrodes of the two adjacent pixels.